Editorial

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Biographical notes: Božo Smoljan received his BS and MS degrees from the Faculty of Engineering of the University of Rijeka, Croatia, and his PhD from the Faculty of Mechanical Engineering of the Belgrade University, Serbia. Currently, he is a Full Professor and the Head of Department of Materials Science and Engineering at the Faculty of Engineering of the University of Rijeka, Croatia. He is also the President of the Croatian Society for Heat Treatment and Surface Engineering. His fields of interest are materials science and engineering. He is the author of three books and more than 100 articles scientific publications.

Janez Grum is a Professor of Materials Science at the Faculty of Mechanical Engineering, University of Ljubljana, Slovenia. He is also the Founder and Editor-in-Chief of a new journal, the *International Journal of Microstructure and Materials Properties (IJMMP)*. He is the editor of six NDT conference proceedings, five ASM, Marcel Dekker and Taylor & Francis book chapters and five books with several reprints. He has also published more than 200 refereed journal papers on heat treatment and surface engineering, laser materials processing and materials testing, including non-destructive testing.

The present issue of the *International Journal of Microstructure and Materials Properties* comprises seven papers discussing investigations conducted on various fields of materials and materials properties. Papers were selected among papers presented at International Federation for Heat Treatment and Surface Engineering (IFHTSE) conference titled 'New Challenges in Heat Treatment and Surface Engineering' held in Cavtat, Croatia 2009 while the last three were selected among spontaneously received papers. All papers have been reviewed according to journal procedures and standards.

Hernández-Morales et al. carried out experimental determination of the temperature evolution at immersion quenching in still water. They inserted thermocouples into a probe or actual part to determine cooling curves. They explored the possibilities and limitations of a technique based on measuring the temperature increase of the quenchant in the vicinity of the metal surface. Experimental work was conducted on conical-end

cylindrical AISI 304 stainless steel test probe quenched in still water at 60ºC. The thermal response in the quenchant was quite sensitive to the proximity of the thermocouple to the surface of the metal as well as to the thermocouple position in the vertical direction.

Schneider et al. researched microstructural changes during short-cycle of induction hardened cold-work tool steels. Their investigations showed there are significant changes in the alloying distribution depending on the austenitising parameters. Results showed that short-cycle tempering conditions caused transformation of the tetragonal martensite and the decomposition of the retained austenite was shifted to significantly higher temperatures. At appropriate austenitising and tempering parameters similar hardness and toughness properties can be achieved as for standard heat treatment condition leading to good hardness values with a fine ductile fracture surface.

Fahlkrans et al. studied influence of tempering on contact fatigue. Most components are tempered after heat treatment operations such as case hardening or induction hardening. The common opinion is that the martensitic structure after heat treatment is too brittle and tempering is necessary to increase toughness. Two carburised steels, EN 22NiCrMo12-5F mod. A and EN 20NiCrMo2 for contact fatigue resistance were tested. The tested specimens were characterised with respect to amount of fatigue damage, residual stress, amount of retained austenite and hardness. Their objective was to determine if tempering is always necessary after heat treatment operation.

Matijević et al. presented characterisation and determination of Ni-P coating sputtering rate. Electroless nickel (EN) plating coating was prepared using hypophosphite reduced EN bath at pH 4.8–5.6 and temperature 91 ± 3°C. Density of the bath was 1.04 g/cm^3 and deposition rate was 18 μm/hour for plain Ni-P coatings. It enabled to obtain a coating of nickel-phosphorus containing phosphorus at 10% level. The Ni-P coating was characterised by optical microscopy (OM), scanning electron microscopy with energy dispersive spectroscopy and glow discharge optical emission spectrometry. Hardness was determined on a micro hardness tester using a 100 g load. The amount of P in the investigated coating was 10.1%. The composition of coating was in accordance with the obtained result of microhardness.

Chauhan and Misra assessed grain size and lattice parameters of titanium alloy through electromagnetic emission technique during failure under tension. The electromagnetic radiation amplitude decreases with increase in grain size. The magnitude of variation depends upon the processing history of specimens. The experimental results are in close agreement with the theoretical predications presented in this paper. A comparison with the results showed that the nature of EMR responses with lattice parameters was independent of metal crystal structure.

Ramadoss and Rajadurai studied finite element simulation of forming limit diagram for austenitic stainless steel AISI 316LN. The experimental forming limit diagram was determined by a hemispherical punch stretching test using suitably designed and fabricated tools. Sheet metal forming simulation was performed using the finite element software. A new failure criterion was introduced based on localised necking for the prediction of forming limit. The transition in the state of strain could be considered as the onset of localised necking instant of failure. An error analysis on the FE-predictions was performed and the percentage deviation between 0.28% and 12.24%was found.

Chaouche et al. talk about effect of microstructure on corrosion resistance of pipelines steels buried in alkaline soil. They examined the effect of microstructure of low carbon pipeline steels on their behaviour to corrosion when they are buried in alkaline soil. In such environment, the corrosion rate depends on a number of different

parameters. The most significant of them is the formation, evolution and nature of the corrosion products, which are deposited on the metal surface. The laboratory experiments realised from electrochemical measurements and characterisation of corrosion products showed that the microstructure influences the properties of the corrosion layers, such as morphology, proportion of the various chemical compounds and adherence of the film.

We sincerely expect that in the papers published everyone will find a small part of useful information for engineers and researchers that could be added to their mosaic of information needed at their professional work.

Special thanks go to my colleague Prof. Dr. Božo Smoljan from the Faculty of Engineering, University of Rijeka, Croatia who helped me editing papers.